

COLORADO RIVER RECOVERY PROGRAM  
FY-2002 PROPOSED SCOPE OF WORK

Project No.: 87b

Lead Agency: Colorado Division of Wildlife  
Submitted by: Tom Nesler, Richard A. Valdez, Melissa Trammell

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Category:

☒ Ongoing  
☐ Ongoing-revised project  
☐ Requested new project  
☐ Unsolicited proposal

Expected Funding Source:

☒ Annual funds  
☐ Capital funds  
☐ Other (explain)

I. Title of Proposal: Nonnative fish control in backwater habitats in the Colorado River in Colorado.

II. Relationship to RIPRAP

Colorado River Action Plan: Mainstem

III. Reduce negative impacts of nonnative fishes.

III.A.3.a. Remove small nonnative cyprinids from backwaters and other low velocity habitats.

III. Study Background/Rationale and Hypotheses

One of the contributing factors to the listed status of the Colorado River endangered fishes is impact of nonnative fish species upon the survival and recruitment of the endangered fishes during their early life stages (Bestgen 1997, Bestgen et al. 1997, Beyers et al. 1994, Muth and Snyder 1994, Lentsch et al. 1996, Tyus and Saunders 1996). Previous research and monitoring have demonstrated nonnative fish species such as red shiner, fathead minnow, and sand shiner predominate in low-velocity riverine habitats such as backwaters (Burdick 1995, Anderson 1997, Osmundson and Kaeding 1988, McAda et al. 1996, McAda et al 1994). These same backwaters provide nursery habitat to larval and young-of-the-year life stages of razorback sucker and Colorado pikeminnow; and are believed to be important for bonytail.

Predation and competition between the small, nonnative cyprinid species and the young of the endangered fishes has been demonstrated in laboratory experiments (Muth and Beyers, unpublished data), and is perceived to be influential in limiting survival and recruitment for razorback sucker and Colorado pikeminnow in the wild. Lentsch et al. (1996) recommended seining of select habitats as a viable mechanical control option for introduced cyprinids such as red shiner, fathead minnow, and sand shiner. It is not anticipated that any control strategy implemented in the field will eliminate prolific nonnative fish species. It is considered feasible to attempt to reduce the abundance of select nonnative fishes like the small cyprinids to evaluate, in time and space, the effectiveness of the control methods used and positive biological responses from the native fish community in general and the endangered fish species in particular. The goal of this approach to nonnative fish control is to create conditions favorable for reproductive and recruitment success for the endangered fishes, thereby increasing the abundance of their adult and spawning populations and contributing to their recovery.

Relevant hypotheses are:

- H<sub>0</sub>: Seine sampling of backwaters will be effective in depleting numbers of nonnative fish species using these habitats in terms of significantly decreasing catch rate indices within and among sampling efforts.
- H<sub>a</sub>: Seine sampling removal of nonnative fishes from backwater habitats will be effective in terms of significantly increasing the relative and/or absolute abundance indices for native fishes and the endangered fishes estimated through ISMP fall seine sampling.

#### IV. Study Goal and Objectives

**Goal:** to reduce abundance and proliferation of small nonnative cyprinid and centrarchid fish species in mainstem Colorado River backwater habitats for the benefit of survival and recruitment of native and endangered Colorado River fish species.

#### **Objectives:**

1. To significantly reduce the abundance of small nonnative cyprinid and centrarchid fish species present within and among backwater habitats throughout critical habitat in the Colorado River on a per sampling trip and seasonal basis.
2. To significantly increase the survival and abundance of native and endangered fish species using backwater habitats in the Colorado River.
3. To evaluate backwater seining as an effective field method for controlling the abundance of small nonnative cyprinid and centrarchid fish species and for inducing a positive biological response within the native fish communities of the river.

#### V. Description of past performance on this or similar projects.

There have been no projects similar to the purpose of this one conducted by the Division in the past. The Division has successfully implemented the ISMP fall seine sample

program to monitor reproductive success and survival of young-of-the-year Colorado pikeminnow in the Colorado River.

## VI. Study Area

Colorado River: 15- and 18- mile reaches: RM 171-185.4, and RM 152-171 (Palisade to Loma) (33.5 miles)

## VII. Study Methods/Approach:

Sampling was conducted for a 3-week period during March/April, or June/July in three field seasons (1999, 2000, 2001). Four or five depletion passes were conducted in each reach each year. All backwaters within the study reaches were sampled in the following manner.

A seine was extended across the backwater mouth and pulled toward the apex. A second seine was used to block behind the sampling seine in the event the sampling haul was interrupted. At least two complete sampling efforts of the back water, from mouth to apex, was conducted. A third or fourth depletion haul was conducted if catch rates warranted.

Upon completion of a seine haul, the seine contents were examined in the water for a cursory estimation of the presence of young native fish. If the relative abundance of native fish such as roundtail chub, flannelmouth sucker, or bluehead sucker in the sample was estimated to be 50% or more in the first seine haul, further sampling of the backwater was terminated for that week. Depletion sampling continued if the relative abundance of nonnative fishes was estimated to be greater than 50%. Depletion sampling refers to the removal of the fish collected via seine sampling from the backwater habitat in order to deplete the numbers of fish present. Each seine haul made was weighed to the nearest gram wet weight. A subsample of each seine haul was taken and preserved in 10% formalin to determine species composition and relative abundance. Length and width of the backwater was measured to establish area sampled.

Native fishes captured during depletion seining were held in portable live pens placed in the sample backwater to ensure that water quality and temperature were not dramatically changed and that all native fishes were kept alive and healthy for subsequent release. The nonnative fish removed from each backwater were disposed of discretely and professionally.

This sampling process was repeated at each backwater encountered in each of the target reaches. Depletion sampling was conducted in each reach once per week for a total of 4-5 sampling trips. Data analysis included estimation of species composition and relative abundance per seine haul, per backwater, and per river reach. Estimation of the total numbers and biomass of nonnative fish removed from each backwater and river reach was extrapolated using subsample numbers and weights, and the total weight of the sample in each seine haul. Backwater area sampled was used to establish an index of effort each week and each year for each river reach.

A positive biological response to this depletion sampling was evaluated using the standard abundance indices estimated from subsequent ISMP seine sampling each September on the Colorado River from Palisade to Westwater. A positive response is defined as (1) increases in the total number of native fishes collected via ISMP, (2) increases in the relative abundance of each native fish species as estimated from ISMP sampling, (3) increases in areal seine catch rates for native fish species as estimated from ISMP collections, and (4) similar increases in numbers collected, relative abundance, or catch rates of Colorado pikeminnow young-of-year within ISMP samples. Increases in the abundance indices of native fish species and the endangered fish species, as well as significant reductions in the magnitude of catch rates of nonnative fishes were considered as measurements of effectiveness for periodic control of nonnative cyprinid species, and for positive response from the native fish community. It is clearly understood that effects of other environmental factors may introduce bias, variation, and confounding influences into the interpretation of biological responses described above for the target native and introduced fish species.

#### VIII. Task Description and Schedule

- 1) Interim progress reports following spring depletion sampling by September 30, 2001
- 2) Annual progress reports following each spring depletion fall ISMP sampling cycle by December 15, 2001.
- 3) Draft report following fall 2001 ISMP sampling cycle by March 30, 2002.

#### IX. FY-02 Work

##### - Deliverables/Due Dates

- 1) Interim progress reports following spring depletion sampling by September 30, 2001.
- 2) Annual progress reports following each spring depletion fall ISMP sampling cycle by December 15, 2001.
- 34) Draft report to coordinator March 30, 2002 (contingent upon receipt of fall 2001 ISMP data prior to Feb 1, 2002); revised draft to peer review and BC April 30; back to BC July 15.
- 4) Voucher fish sample collection available for further life history analyses of nonnative fish species of concern or backwater fish community.

#### X. Budget Summary

Field sampling was completed in FY 2001. Budget in FY 2002 covers data analysis, report completion, and presentation at Annual Researchers meeting.

A. Labor: \$ 13,240

-Valdez (\$110/hour x 40 hours = \$4400)

-Trammell (\$65/hour x 120 hours = \$7800)

-Editor (\$65/hour x 16 hours = \$1040)

Travel: \$ 3,800

Vehicle operation \$ 300

Total \$ 17,340

##### B. Summary

a) Total for study/year

FY99 \$ 34,505.27

FY00	\$ 52,191.39
FY01	\$ 52,017.99
FY02	\$ 17,340
b) Total for three-year study period	\$156,054.00

## XI. Reviewers

Dr. Kevin R. Bestgen, Larval Fish Laboratory, Colorado State University, Fort Collins  
 Keith Rose, U.S. Fish and Wildlife Service, Grand Junction, Colorado  
 William E. Davis/Robert Forrest, Eco Plan Associates, Mesa, Arizona

## XII. References:

- Anderson, R. 1997. An evaluation of fish community structure and habitat potential for Colorado pikeminnow and razorback sucker in the unoccupied reach (Palisade to Rifle) of the Colorado River, 1993-1995.
- Bestgen, K. R. 1997. Interacting effects of physical and biological factors on recruitment of age-0 Colorado pikeminnow. Ph.D. dissertation, Colorado State University, Fort Collins.
- Bestgen, K. R., D. W. Beyers, G. B. Haines, and J. A. Rice. 1997. Recruitment models for Colorado pikeminnow: tools for evaluating relative importance of natural and managed processes. Final report. Larval Fish Laboratory Contribution 95. Colorado State University, Fort Collins.
- Beyers, D. W., R. T. Muth, and M. S. Farmer. 1994. Experimental evidence of competition between larvae of Colorado pikeminnow and fathead minnow. Final report. Larval Fish Laboratory, Colorado State University, Fort Collins.
- Burdick, B. D. 1995. Ichthyofaunal studies of the Gunnison River, Colorado 1992-1994. Final report. Colorado River Fishes Recovery Program, U. S. Fish and Wildlife Service, Grand Junction, Colorado.
- Lentsch, L. D., R. T. Muth, P. D. Thompson, B. G. Hoskins, and T. A. Crowl. 1996. Options for selective control of nonnative fishes in the upper Colorado River Basin. Final Report. Utah Division of Wildlife Resources Publication No. 96-14. Utah Division of Wildlife Resources, Salt Lake City.
- McAda, C. W., T. E. Chart, M. A. Trammell, K. S. Day, P. A. Cavalli, and W. E. Elmlad. 1996. Interagency standardized monitoring program, summary of results, 1995. Colorado River Endangered Fishes Recovery Program, U.S. Fish and Wildlife Service, Denver.
- McAda, C. W., J. W. Bates, J. S. Cranney, T. E. Chart, W. E. Elmlad, and T. P. Nesler. 1994. Interagency standardized monitoring program, summary of results, 1986-1992. Final report. Colorado River Endangered Fishes Recovery Program, U.S. Fish and Wildlife Service, Denver.

Muth R. T., and D. E. Snyder. 1994. Diets of young Colorado pikeminnow and other small fish in backwaters of the Green River, Colorado and Utah. *The Great Basin naturalist* 55(2): 95-104.

Osmundson, D. B., and L.R. Kaeding. 1988. Studies of Colorado pikeminnow and razorback sucker use of the '15-mile reach' of the upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales. Final report. U.S. Fish and Wildlife Service, Grand Junction.

Tyus, H. M., and J. F. Saunders, III. 1996. Nonnative fishes in the upper Colorado River Basin and a strategic plan for their control. Final report. Colorado River Endangered Fishes Recovery Program, U. S. Fish and Wildlife Service, Denver.